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Sugar Beets at Fresno.

The culture of the sugar beet in the San Joaquin valley has until lately remained a bare suggestion. It is well known that they have been successfully grown near Isleton and Sacramento, on the moist lands of the Sacramento river, on which irrigation is unnecessary. It is doubtful that the sugar beet has ever been cultivated where irrigation is indispensable, and this fact, as well as the high summer temperature of the southern valley, has discouraged the attempt. In fact, the very idea of a root filled full of irrigation water, and then wilted by the torrid heat, is enough to excite the antipathy of the manufacturer.

The success of the sugar beet in Los Angeles, however, encouraged the hope that with a proper selection of soil and of the time of planting and irrigation, a root suitable for the sugar-maker might be produced in the San Joaquin valley; and, if so, that the crop might be made to supplement that of the coast valleys so as to prolong materially the annual campaign, the shortness of which is a heavy charge on the capital invested in the somewhat costly plant of beet-sugar factories. As stated in a paper on the subject, published in the December number of the *Overland Monthly*, the campaign period in Europe usually does not much exceed three months—October, November, December—while in California, owing to the favoring climatic conditions, there is no difficulty in lengthening it to the five months from September to January, both inclusive. If by early sowing in the precocious season of the Upper San Joaquin two or three months more could be added to the time of campaign, it would place beet-sugar production in this State on a ground of vantage from which it might calmly defy the competition of its tropical competitor, the sugar-cane.

Preliminary experiments to test the feasibility of growing good sugar beets under the condition of the Fresno climate have, during the present season, been made by Mr. M. Denicke of

VARIETIES OF WHEAT AND THE HESSIAN FLY.

Name of Variety.	1886. Sown February 25th.	1887. Sown January 24th.
Missoyen	Small crop, but no fly found	Good crop; no fly.
Palestine	Fair crop; no fly	Good crop; no fly.
Petali	Fair crop; no fly	Good crop; no fly.
Volo	Good crop; no fly	Good crop; no fly.
Atlanti*	Small yield; no fly	Good crop; very few flaxseeds.
Forelle	Fair crop; no fly	Fair crop; no fly.
Common March	Fair crop; very few flies	Good crop; no fly.
Diamond		Good crop; no fly.
Ex. Early Oakley	Failure; abundantly infested	Good crop; very few flies.
McGeehee's White	Failure; largely infested	Good crop; no flies.
Polish	Fair crop; somewhat infested	Good crop; no flies.
Red Sea	Failure; badly infested	Good crop; no flies.
Victoria	Not sown	Good crop; no flies.
Brenner White Club†	Not sown	Poor yield; no flies.
Winter Crimea	Not sown	Good crop; no flies.
Nicaragua	Not sown	Good crop; very few flies.
White Genoese	Fair crop; slightly infested	Fair crop; very few flies.
Raub's Black Prolific	Not sown	Good crop; no flies.
Winter Fulcaster	Not sown	Good crop; no flies.
Russian Red Bearded	Not sown	Good crop; some flies.
Centennial Black	Nearly destroyed	Good crop; some flies.
Big White Club, Oregon	Poor; abundantly infested	Good crop; few flies.
Diehl's Mediterranean	Failure; abundantly infested	Fair crop; few flies.
Egyptian	Failure; abundantly infested	Good crop; few flies.
Faltz	Failure; somewhat infested	Good crop; some flies.
Improved Circassian	Fair crop; somewhat infested	Good crop; very few flies.
Little Club	Very poor; badly infested	Good crop; very few flies.
Mammoth	Very poor; badly infested	Good crop; very few flies.
Nonette Lousanne	Fair crop; few flies	Good crop; very few flies.
Touzelle	Poor crop; badly infested	Poor crop; badly infested.
Tunisian	Poor crop; badly infested	Good crop; few flies.
White Banate	Poor crop; badly infested	Good crop; few flies.

*Seed sown in 1886 was very old, from museum specimen; growth of 1886 resown in 1887.
†Old seed from museum collection.

Fresno. Mr. D. obtained last autumn from Mr. Dyer of Alvarado, some reliable sugar-beet seed, and sowed it at intervals from December to April. The results of the examination of three lots, planted and harvested as stated below, were as follows:

Lot No. 1.—Seed sown in December, harvested May 27th. The lot consisted of four roots, two of which (A) showed just an indication of new growth starting in the center, while in the two others (B) a short seed-stalk was already formed, so that they had evidently passed the proper stage for sugar-making.

Lot No. 2.—Two beets from seed planted early in April by Mr. L. J. McCleary, on sandy, ashy soil on King's river, six miles east from Selma. Harvested June 26th. Little or no indication of new growth starting.

Lot No. 3.—Two roots. Seed sown about March 15th, on "white-ash" soil. Harvested June 29th. Somewhat fresh-looking in the center but no serious show of new growth.

Lot No. 4.—Date of sowing not stated. Roots in good apparent condition. Harvested August 4th. The assays resulted as follows:

ASSAYS OF FRESNO SUGAR BEETS.

	Sown.	Harvested.	Average Wt. Ounces.	Cane Sugar. Per Cent.	Purity. Coefficient.
Lot No. 1 A	Dec.	May 27	21	10.1	82 6
Lot No. 1 B	Dec.	May 27	24	7.0	70.0
Lot No. 2...	Apr. 10?	June 26	18	10.5	80.7
Lot No. 3...	Mar. 17?	June 29	22	12.6	82.0
Lot No. 4...	?	Aug. 4	25	13.2	75.3

With regard to the data in this table it should be stated for the benefit of the general reader that roots having an average of 10 per cent of cane sugar and a purity coefficient of 80 (that is, 80 per cent of cane sugar in the total solid contents of the juice) would be considered a fair workable material by the sugar-maker. But a higher sugar per cent in the juice may offset a lower degree of purity, and *vice versa*.

It will be noted that the average of the three first lots (leaving out of consideration lot 1, B) is 11.1 per cent of sugar with a purity coefficient of 81.4; they are therefore amply within the limits stipulated by the sugar-maker. As for lot 1, B, the fact that the roots had begun to throw out seedstalks shows at once that they had passed beyond the limits within which the crop should have been harvested. I conjecture that this growth had been started by untimely irrigation. As for lot 4, although it shows a somewhat higher sugar percentage than No. 3, its lower purity coefficient would nevertheless render it less desirable as it stands; but the appearance of the roots suggests in this case, also, that the proper time for harvesting had passed by.

Considering that the persons growing these beets were without experience in the premises; that, in fact, irrigation has probably never been before applied to the production of sugar beets; and that the right time and the proper amount must in this case be considered as at least equally as important as in the case of wine grapes, the results thus obtained are exceedingly encouraging. They imply that in Middle California the working campaign for sugar beets can very probably be extended through the months of June, July and August, making it reach from June 1st to February 1st; and considering that the beets of the first lot had already passed their best condition by a week or two, and that with somewhat improved arrangements for the preservation of the late-grown beets they can probably be carried to the middle of February, we can foreshadow the possibility of such an extraordinary feat as an *eight-months'* campaign of a beet-sugar factory, running on fresh beets. With the additional possibility of utilizing beets sliced and dried under the same conditions as the raisin crop, the full 12 month may ultimately be called into requisition.

It must, however, be remembered that in order to realize such results, it must be feasible to bring the beets of the San Joaquin valley and those of the coast valleys within reach of one and the same factory plant. The roots will not bear railroad transportation to any distance; but with cheap water transportation it might be feasible to let the crops of Fresno and Merced start up the factories located in the upper bay region, in June, and to keep them running until the middle of February by supplies from the coast region.

It is to be hoped that more extended and carefully guarded experiments will be made the coming season, even if the omission of Congress to render the Experiment Station bill effective by means of an appropriation should not be made good in time.

E. W. HILGARD.

Berkeley, Aug. 12, 1887.

The Hessian Fly and Resistant Grains.

In Bulletin No. 58 of the University Experiment Station (issued Oct. 9, 1886) is given a sketch of the results of an experiment made in 1886 to test the resistance of a large collection of grain varieties to the attacks of the Hessian fly (*Cecidomyia destructor*). The annual report for 1886, which is now nearly ready for distribution, will contain a fuller account of the same experiment. For the purpose of verifying the results of last year, and at the same time to determine other points in view, the full collection of cereals was resown in 1887, on the same fly-infested ground. In addition to the varieties sown last year, there were a number of new sorts, some selected with special reference to their supposed resisting quality.

The present announcement is for the pur-

pose of giving early notice of the varieties which gave best results, and in some cases to compare the outcome of two years' trial. A full consideration of other points involved in the experiment will be reserved for the next annual report. The following table gives the behavior of certain varieties of wheat under attack by the Hessian fly:

The foregoing are a few varieties chosen from over 150, which have been tested this year, and they are selected with a view of pointing out some of the most obvious conclusions concerning resisting quality.

First: The value of early sowing is apparent, for it is shown that quite a number of varieties which yielded entirely to the fly last year were able this year, by having a growing season a month longer, to pull through and make a fair to good yield on the same ground that they failed on last year. At the same time it appears that the time of sowing does not fully hold the key to the situation, for some varieties were destroyed both years. The full report will show more instances of this kind than it is thought worth while to cite at this time.

Second: That the resisting quality inheres in the variety largely, is shown by the continued resistance of the varieties which succeeded last year, and which were therefore sent out for experiment in fly-infested districts last winter. These varieties are the first six enumerated in the table above. In most of these cases an improved yield was secured by earlier sowing this year, but whether yielding little or much, they had the same distastefulness to the fly.

Information Desired.

This brief statement is made chiefly with the design of drawing out reports from those to whom we sent resisting varieties for trial. Such local experience will be of great value in the full discussion which is contemplated. We desire not only the facts of yield and behavior of these varieties themselves but a comparison of them with other varieties commonly sown in the localities; also what is the conclusion of the grower of the value of these strong growing dark varieties, either for home use or in the market.

During the year we have been in correspondence with Miss Eleanor A. Ormerod, Consulting Entomologist of the Royal Agricultural Society of England, in reference to the Hessian fly and its work. Miss Ormerod announced the discovery of the fly in English grainfields in July, 1886. Up to that time its presence had not been observed. Miss Ormerod's tenth report contains a very interesting description of her investigations and study of the insect. One point on which Miss Ormerod desires the observation of others who may be handling fly-infested grain is the point at which the flax-seeds or *puparia* are deposited in the process of thrashing. She did not find them in the cleaned grain nor in the chaff blown out by the fan, but found them in great abundance with the screenings which in English practice seem to be deposited just beneath the machine. The point of deposit in California would depend upon the kind of cleaner which is used with the thrasher. We would esteem it a favor if any reader who may have opportunity to make examination on this point would send us the results. The *puparia* are called "flax-seeds" from their resemblance thereto. They are generally about one-sixth of an inch long, smooth, spindle-shaped, or pointed at both ends, and of different shades of chestnut color. When very thickly crowded in the stem, they are irregularly compressed but would still be recognizable. We shall be glad to receive notes on the occurrence of such bodies in screenings, and to receive small samples of screenings which may be thought to contain them. Of course if it is found that these bodies are largely aggregated by the process of thrashing, measures can be taken to somewhat reduce the pest by treatment of the screenings, which is calculated to destroy the insect when in this form. Such measures, coupled with burning the straw and stubble right after removing the grain from the field, would seem to be a serious blow to the increase of the fly. Our experiment this year included a large collection of varieties of barley. The results, which will be more fully discussed at another time, show that barleys were much less seriously affected this year than last, and that a number of kinds which failed last year gave very satisfactory returns this year.

E. J. WICKSON.

Berkeley, Aug. 12th.